

## **Modularly Expandable Housing**

**[001]** The invention relates to a modularly expandable housing. Especially, it concerns a housing of the type referred to as a top-hat rail housing, which is used in the process measurement/process control technologies.

**[002]** The applicant markets different types of process transmitters under the trademark PRELINE for a wide variety of applications. An example is the process transmitter PRELINE RMA 422 which is a multifunctional, 1-2 channel, top-hat rail device with intrinsically safe current input and measurement converter power supply, limit value or, alarm set point, monitoring, mathematics functions and 1-2 analog outputs. Among its uses, this known process transmitter serves for temperature display and temperature monitoring, for process data acquisition and process monitoring, for process control, for signal conditioning and signal conversion, as well as signal doubling. It is capable of forming new process parameters through the use of calculation operations (addition, subtraction, multiplication) on the input signals. The known transmitter has scalable analog outputs for current and voltage, a serial interface for data exchange, a liquid crystal display and pushbuttons for local operation and local display.

**[003]** In the case of complex applications, e.g. when the signals from a number of field apparatuses must be processed, it is

usual that several process transmitters are required. The individual transmitters must then be secured on the top-hat rail, and, according to the known solutions, this requires that tools be used.

5     **[004]**     An object of the invention is to provide a modularly expandable housing, that can be fitted in simple way and manner to different demands in the process measurement/process control technologies.

10     **[005]**     The object is solved, in that the housing exhibits a predetermined number of receiving shafts, a corresponding number of insertion modules is provided, which are insertable into the receiving shafts, and each insertion module has a releasable locking device, by way of which each insertion module is lockable in a receiving shaft or removable from the receiving shaft.

15     According to an advantageous further development of the housing of the invention, it is provided that the locking device is provided, respectively, in the lower region of each insertion module and on the base surface of the housing. The locking device can be formed especially simply, when it is embodied as a snap connection. For  
20     this purpose, according to an advantageous embodiment, there are two engagement elements, especially two snap hooks, provided on the base surface of the insertion module. These engage in the locking position in two corresponding recesses in the base surface of the housing.

[006] An advantageous embodiment of the housing of the invention provides that the insertion module is a plug-in card module or a blind, or dummy, module. In the case of the plug-in card module, such can e.g. be a module for calculating and/or display of a process or control parameter, a module for connecting the sensor to a bus, or a network part.

[007] The invention is explained in greater detail on the basis of the following drawings, which show as follows:

[008] Fig. 1: an exploded view of a preferred embodiment of the housing of the invention;

[009] Fig. 2: an exploded view of the support frame, with two plug-in card modules and one blind module;

[010] Fig. 3: an exploded view of the support frame with one plug-in card module;

[011] Fig. 4: a plan view of the housing in the direction of arrow A in Fig. 1;

[012] Fig. 5: a plan view of the housing in the direction of arrow B in Fig. 1; and

[013] Fig. 6: a side view of a plug-in card module or a blind module.

[014] Figs. 1 to 5 illustrate in different views a preferred embodiment of the modularly constructed top-hat rail housing 1 of the invention. Fig. 1 shows an exploded view of a preferred embodiment of the housing 1 of the invention, while Fig. 2 is an

exploded view of the assembled housing 1 and the insert modules 14, 15. Fig. 3 concerns an exploded view of the support frame 3 and only one plug-in card module 14, 15. Fig. 4 provides a plan view of the housing 1 in the direction of arrow A of Fig. 1, while Fig. 5 shows a plan view of the housing 1 in the direction of arrow B of Fig. 1. Fig. 6 presents a side view of a plug-in card module 14 or blind module 15. Housing 1 of the invention is provided, for example, for a steam- or heat-quantities calculator. Such calculators are used in the energy industry, in the chemical and pharmaceutical industries, in the foods industry, in heating and air conditioning technology, and in plant and equipment construction.

**[015]** Housing 1 has three insertion shafts 4 for receiving a maximum of three insertion modules 14. The insertion modules 14 can be plug-in card modules, which can serve e.g. for calculating and/or display of a process or control parameter, or for connecting a sensor to a bus. Also, the plug-in card module can be a network part. In case the number of receiving shafts 4 exceeds the number of required insertion modules 14, a blind module 15 is provided as a place holder.

**[016]** Housing 1 has a support frame 2 with three receiving shafts 4. The two side walls 5, 6 with the circuit cards 7, 8 secured thereon can be connected to the support frame 2 with click connectors. Display board 9 is connected on the front of the

support frame 2. Front frame 10 is positioned in front of the display board 9. Especially, the display unit is a liquid crystal display. The insertion modules 14; 15 are individually positionable and lockable in the receiving shafts 4 of the support frame 2.

[017] An insertion module 14; 15 is inserted from above into one of the receiving shafts 4. On the base surface or underside of the insertion module 14, 15 are two flexible snap hooks 12, which engage in corresponding recesses 13 on the base surface 3 of housing 1. By pressing both snap hooks 12 of an insertion module 14, 15 together, the locking is released in simple manner and the insertion module 14, 15 can then be removed by simply pulling it from the receiving shaft 4. To make electrical contact, the board tongue 17 on an insertion module 14, 15 engages in the plug-in connector 18 of the bus board.

## List of Reference Symbols

	1	housing of the invention
	2	support frame
	3	base surface of the housing
5	4	receiving shaft
	5	side wall
	6	side wall
	7	circuit card
	8	circuit card
10	9	display board
	10	front frame
	11	locking device / snap connection
	12	engaging element / snap hook
	13	recess
15	14	insertion module / plug-in card module
	15	blind module
	16	base surface of the insertion module
	17	board tongue
	18	plug-in connector on bus board